determine the relative distance between itself and the mobile terminal based on the mobile terminal's location. Alternatively, in some embodiments, location server **120** can determine the relative distance between an electronic device, such as any/all of electronic devices **101-104**, and the mobile terminal and send this relative distance information to any/all of electronic devices **101-104**.

Once an electronic device determines it is near a terminal, based on ranging operations with one or more of UWB radios **110A-D** and communication with location server **120** via wireless radio **122**, the electronic device may select the appropriate credential (e.g., virtual payment card) that is compatible with the terminal. If a user of the electronic device wishes to engage in a transaction, the electronic device may be placed near the mobile terminal to initiate a transaction via, for example, NFC. In some embodiments, the electronic device may require an additional authentication measure—such as, for example, a personal identification number (PIN), a biometric reading (input) such as a fingerprint or voice sample, or a facial image—to authorize and/or complete the transaction with the terminal. In some embodiments, the electronic device may not require additional authentication measures, and the transaction may be completed by "hovering" the electronic device near the terminal (e.g., within a sufficiently close distance to perform an NFC connection).

A benefit, among others, of the electronic device selecting an appropriate credential (e.g., virtual payment card) based on location and/or type of terminal is enhanced user experience, such as ease of payment for the user. With the electronic device selecting the appropriate payment mechanism, user interaction to search for the appropriate credential is not required, thus improving user experience. In some instances, automatic selection of the appropriate credential also increases transaction speed, such as in a transportation transaction. Additionally, terminals in environment **100** can be managed by different entities (e.g., different merchants and transit companies). To process transactions with different types of terminals, the disclosed embodiments enable selecting an appropriate credential (e.g., virtual payment card) that is compatible with an adjacent terminal. Accordingly, a terminal can be permitted to process one or more credentials, while other payment types are not supported. Further, the transaction can be independent of terminal type and NFC capability (e.g., NFC-type A, NFC-type B, or NFC-type F).

FIG. **2** illustrates an example signaling flow **200** for determining a location of an electronic device, according to some embodiments. In particular, signaling flow **200** depicts a messaging communication between a UWB radio **210**, an electronic device **201**, and a location server **220**, which respectively may be embodiments for UWB radios **110A-D**, electronic devices **101-104**, and location server **120** of FIG. **1**.

In some embodiments, UWB radio **210** may broadcast a POLL message **230** at a time t_1. In some embodiments, POLL message **230** may include header information and payload information. The header information may include a packet identifier, an identifier associated with UWB radio **210**, and configuration information related to a specific UWB PHY layer option used by UWB radio **210** (e.g., a direct sequence UWB). The payload information may include information such as, for example, a timestamp of the time of transmission. In some embodiments, POLL message **230** elicits a response from another UWB-equipped device (e.g., electronic device **201**) so that UWB radio **210** may calculate a distance measurement.

Electronic device **201** may receive POLL message **230** at a time t_2. After processing POLL message **230**, at a time t_3, electronic device **201** may transmit a RESPONSE message **232** to UWB radio **210**. In some embodiments, RESPONSE message **232** includes header information and payload information. The header information may include a packet identifier, an identifier associated with UWB radio **210**, and an identifier associated with electronic device **201**. The payload information may include several parameters such as, for example, a timestamp of the time t_2 for the receipt of POLL message **230** and a timestamp of the time t_3 for the transmission of RESPONSE message **232**.

UWB radio **210** may receive RESPONSE message **232** at a time t_4 and may send a FINAL message **234** at a time t_5. In some embodiments, FINAL message **234** is optional and includes header information and payload information. The header information may include a packet identifier, an identifier associated with UWB radio **210**, and an identifier associated with electronic device **201**. The payload information may include several parameters such as, for example, a timestamp of the time t_4 for the receipt of RESPONSE message **232** and a timestamp of the time t_5 for the transmission of FINAL message **234**. Electronic device **201** receives FINAL message **234** at a time t_6.

In some embodiments, electronic device **201** may exchange messages—such as messages **230-234**—with multiple UWB radios in an overlapping manner. Depending on a desired accuracy of location information, UWB radio **210** may send POLL message **230** repeatedly in the order of, for example, milliseconds.

UWB radio **210** may determine a distance based on the time of flight (ToF) of messages **230-234**. ToF may be determined before, after, or in parallel with transmitting FINAL message **234**. In some embodiments, the following equations can be used to calculate the ToF and thus determine the distance between electronic device **201** and UWB radio **210**:

$$\text{Time of Flight}(ToF) = t_4 - t_3 = t_2 - t_1 = \frac{(t_4 - t_1) - (t_3 - t_2)}{2}$$

$$\text{Distance} = \text{Speed of Light} * \text{Time of Flight} = 3.0 * 10^0 * ToF$$

In some embodiments, the ToF and distance may be calculated by UWB radio **210** after receipt of FINAL message **234** and sent to location server **220**. In some embodiments, timestamps of the times t_1, t_2, t_3, and t_4 may be sent to location server **220**, in which case location server **220** may calculate both the ToF and the distance. Alternatively, in some embodiments, the ToF may be calculated by UWB radio **210** and distance may be calculated by location server **220**.

In referring to FIG. **2**, after UWB radio **210** calculates the ToF and the distance, UWB radio **210** may send any/all of the ToF information, distance, and time-related information to location server **220** in a message **238**. In some embodiments, location server **220** may also receive similar distance measurements from one or more other UWB radios that perform some or all of the ranging messaging exemplified by messages **230-234** with electronic device **201**. In some embodiments, with three or more distance measurements received by one or more UWB radios, location server **220** may perform a triangulation (or trilateration) technique **240** to determine the location of electronic device **201** relative to the one or more UWB radios and the environment associated with the UWB radios (e.g., environment **100** of FIG. **1**).